

CLAIMS

What is claimed is:

1. A rotary blending apparatus for mixing a composition, comprising:
a hub; and
5 a plurality of substantially angularly spaced impeller blades, each of said impeller blades having a first and second baffle,
said first baffle having first and second ends, said first end being rigidly connected to said hub, said first baffle forming a first impeller angle with respect to the vertical axis of said hub in the range of approximately 110° - 130°, said second end of said first baffle having a substantially linear edge forming a second impeller angle with respect to the longitudinal axis of said hub in the range of 40° - 50°,
said second baffle having first and second ends, said first end of said second baffle being rigidly connected to said second end of said first baffle, said first and second baffles forming a third impeller angle in the range of approximately 85° - 95°.
- 15 2. The apparatus of Claim 1, wherein said composition comprises a dry powder.
3. The apparatus of Claim 2, wherein said dry powder comprises a pharmaceutical composition.
4. The apparatus of Claim 1, wherein said hub has an outer diameter in the
20 range of 139.0 to 141.0 mm.
5. The apparatus of Claim 1, wherein said first baffle has a first length in the range of 245.0 to 247.0 mm and a first width in the range of 70.0 to 75.0 mm.
6. The apparatus of Claim 1, wherein said second baffle has a second length in the range of 139.0 to 141.0 mm and a second width in the range of 96.0 to 98.0 mm.
- 25 7. The apparatus of Claim 1, wherein each of said impellers impart impact and shear forces to said composition during rotation of said apparatus.
8. The apparatus of Claim 7, wherein the ratio of said impact and shear forces is substantially equal to $1/\tan$ (second impeller angle).
9. The apparatus of Claim 1, wherein said first and second baffles comprise
30 substantially flat, elongated members.

10. The apparatus of Claim 9, wherein said first impeller angle extends substantially uniformly from said first end to said second end of said first baffle.

11. The apparatus of Claim 1, wherein said hub outer diameter, said first and second lengths, said first and second widths, and said first, second and third impeller angles define a first blending apparatus size have a first tip radius, said first blending apparatus size providing a first flow pattern of said composition during rotation of said apparatus.

12. The apparatus of Claim 11, wherein said first flow pattern includes a reverse flow component.

13. The apparatus of Claim 11, wherein said apparatus is scalable to at least a second blending apparatus size having a second tip radius, said second blending apparatus size providing a second flow pattern that is substantially similar to said first flow pattern.

14. A rotary blending apparatus for mixing a pharmaceutical composition, comprising:

a hub having an outer diameter in the range of 139.0 to 141.0 mm; and
a plurality of substantially angularly spaced impeller blades, each of said impeller blades having a first and second baffle,

said first baffle having first and second ends, a first length in the range of 245.0 to 247.0 mm and a first width in the range of 70.0 to 75.0 mm,

said first end of said first baffle being rigidly connected to said hub, said first baffle forming a first impeller angle with respect to the vertical axis of said hub in the range of approximately 110° - 130°, said second end of said first baffle having a substantially linear edge forming a second impeller angle with respect to the longitudinal axis of said hub in the range of 40° - 50°,

said second baffle having first and second ends, a second length in the range of 139.0 to 141.0 mm and a second width in the range of 96.0 to 98.0 mm,

said first end of said second baffle being rigidly connected to said second end of said first baffle, said first and second baffles forming a third impeller angle in the range of approximately 85° - 95°,

said hub outer diameter, said first and second lengths, said first and second widths, and said first, second and third impeller angles defining a first blending apparatus

size have a first tip radius, said first blending apparatus size providing a first flow pattern of said composition during rotation of said apparatus,

5 said apparatus being scalable to at least a second blending apparatus size having a second tip radius, said second blending apparatus size providing a second flow pattern that is substantially similar to said first flow pattern.

15 15. The apparatus of Claim 14, wherein said pharmaceutical composition comprises a dry powder.

 16. The apparatus of Claim 14, wherein each of said impellers impart impact and shear forces to said composition during rotation of said apparatus.

10 17. The apparatus of Claim 16, wherein the ratio of said impact and shear forces is substantially equal to $1/\tan$ (second impeller angle).

 18. The apparatus of Claim 14, wherein said first and second baffles comprise substantially flat, elongated members.

15 19. The apparatus of Claim 18, wherein said first impeller angle extends substantially uniformly from said first end to said second end of said first baffle.

 20. The apparatus of Claim 14, wherein said first flow pattern includes a reverse flow component.

20 21. A rotary blending system for mixing a composition, comprising:
 a mixing container having a mixing chamber;
 a rotatable drive shaft; and
 a rotary blending apparatus disposed in said mixing chamber, said rotary
blending apparatus being connected to said drive shaft, said rotary blending apparatus
including a hub and a plurality of substantially angularly spaced impeller blades, each of
said impeller blades having a first and second baffle, said first baffle having first and
25 second ends, said first end being rigidly connected to said hub, said first baffle forming a
first impeller angle with respect to the vertical axis of said hub in the range of
approximately 110° - 130° , said second end of said first baffle having a substantially linear
edge forming a second impeller angle with respect to the longitudinal axis of said hub in
the range of 40° - 50° , said second baffle having first and second ends, said first end of said
30 second baffle being rigidly connected to said second end of said first baffle, said first and
second baffles forming a third impeller angle in the range of approximately 85° - 95° .

22. The system of Claim 20, wherein said hub has an outer diameter in the range of 139.0 to 141.0 mm.

23. The system of Claim 20, wherein said first baffle has a first length in the range of 245.0 to 247.0 mm and a first width in the range of 70.0 to 75.0 mm.

5 24. The system of Claim 20, wherein said second baffle has a second length in the range of 139.0 to 141.0 mm and a second width in the range of 96.0 to 98.0 mm.

25. The system of Claim 20, wherein each of said impellers impart impact and shear forces to said composition during rotation of said apparatus.

10 26. The system of Claim 25, wherein the ratio of said impact and shear forces is substantially equal to $1/\tan$ (second impeller angle).

27. The system of Claim 20, wherein said first and second baffles comprise substantially flat, elongated members.

28. The system of Claim 27, wherein said first impeller angle extends substantially uniformly from said first end to said second end of said first baffle.

15 29. The system of Claim 20, wherein said hub outer diameter, said first and second lengths, said first and second widths, and said first, second and third impeller angles define a first blending apparatus size have a first tip radius, said first blending apparatus size providing a first flow pattern of said composition during rotation of said apparatus.

20 30. The system of Claim 29, wherein said first flow pattern includes a reverse flow component.

31. The system of Claim 29, wherein said apparatus is scalable to at least a second blending apparatus size having a second tip radius, said second blending apparatus size providing a second flow pattern that is substantially similar to said first flow pattern.